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10/630,037	07/30/2003	Ramachandra N. Pai	BEA920030015US1	7080

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LIEBERMAN & BRANDSDORFER, LLC
802 STILL CREEK LANE
GAITHERSBURG, MD 20878

EXAMINER

CHANKONG, DOHM

ART UNIT	PAPER NUMBER
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2152

MAIL DATE	DELIVERY MODE
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01/24/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/630,037

Applicant(s)

PAI, RAMACHANDRA N.

Examiner

Dohm Chankong

Art Unit

2152

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 14-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 14-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1> This action is in response to Applicant's amendment, filed 11.12.2007. Claims 1, 5-8, 10-12, 14, 16, and 17 are amended. Claim 13 is canceled. Claims 1-12 and 14-17 are presented for further examination.

2> This is a final rejection.

Response to Arguments

I. Summary of §101 and §112 rejections set forth in the previous action

Claims 1-6 and 12-17 were rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 1-17 were rejected under 35 U.S.C. 101 because the disclosed invention is inoperative and therefore lacks utility. Claims 1, 6 and 12 are inoperative because they claim an algorithm with no practical application. Claims 5, 6, 10, 11, 16 and 17 were rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. Claims 5, 6, 10, 11, 16 and 17 were rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Claims 12-17 were rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. Claims 5, 6, 10, 11, 16 and 17 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-17 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing

to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A. §101 and §112 rejections that are withdrawn in light of Applicant's amendment

Applicant's amendment overcomes the §101 rejection of claims 1-6 and 12-17.

Specifically, Applicant has amendment independent method claims 1 and 12 to recite a method that produces a useful, concrete, and tangible result (the return of a grouping of interconnected vertices where it is known that the quantity of interconnection between the vertices is equal to the maximum connectivity count). Therefore, the §101 rejections of claims 1-6 and 12-17 are withdrawn. In addition, the amendments overcome the §101 rejection of claims 1-17. The §101 rejection of claims 1-17 are also withdrawn.

Claims 5, 6, 10, 11, 16 and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Claims 12-17 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. Claims 1-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 5, 6, 10, 11, 16 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These rejections are withdrawn.

B. §101 and §112 rejections that are maintained

Claims 5, 6, 10, 11, 16 and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The rejection of claims 5, 10, and 16 is

withdrawn as they are enabled by the specification. However, the rejection of claims 6, 11, and 17 are maintained. Specifically, Applicant's specification only enables selecting a graph from a cluster of nodes [Applicant's specification, pg. 4, lines 5-12], circuit board components [pg. 6, line 23 to pg. 7, line 1], pattern recognition [pg. 7, lines 1-7], biological data [pg. 7, lines 9-11], and archeological data [pg. 7, lines 9-11].

However, one of ordinary skill in the art would not have been able to apply Applicant's invention to project selection, fault tolerance, coding, computer vision, information retrieval, signal transmission, and alignment of DNA with protein sequences because there is absolutely no disclosure as to how any of these fields are related to Applicant's claimed invention.

II. The interpretation of "maximum connectivity count"

Applicant has amendment the independent claims to more particularly define "maximum connectivity count." Applicant asserts that the interpretation of the term as referring to the number of vertices in the graph is inaccurate because it is not how the term is defined in the specification. Applicant further asserts that "maximum connectivity count" is "defined as total connectivity in which each node in a grouping is connected to each other node in the grouping.

Applicant proceeds to amend the independent claims to define the term as the "greatest integer of connectivity of said vertices obtained from said ordering of vertices." Applicant points to page 4, lines 19-20 in support of this amendment. However, the cited lines and the entirety of Applicant's specification is devoid of any clear definition for "maximum connectivity count." There is no description for setting a count to be the "greatest integer of

connectivity." More clearly, there is no disclosure of comparing the connectivity count of each vertex with a "greatest integer of connectivity of said vertices obtained from said ordering of vertices."

Instead, the only disclosure in Applicant's specification related to any comparison feature at all is directed to comparing the connectivity count of a least connected vertex to "the quantity of vertices in the graph" [Applicant's specification, pg. 4, lines 21-23]. The interpretation of "maximum connectivity count" as referring to the number of vertices in the graph is further supported because Applicant's specification discloses removing a vertex from a graph when its connectivity count "is not equal to the number of vertices in the graph" [pg. 6, lines 4-5]. This disclosure corresponds to Applicant's limitation of "removing a vertex from said graph with said calculated connectivity count less than said maximum connectivity count."

The disclosure also corresponds to claim 4 which recites removing vertices until the connectivity count of a least connected vertex "is equal to said maximum connectivity count." Therefore, examiner's interpretation of "maximum connectivity count" is supported by Applicant's specification. Applicant's amendment however finds no support.

Thus, Applicant's amendment defining the "maximum connectivity count" suffers from §112 issues. Additionally, until Applicant can definitively point to sections in the specification that clearly support the definition proposed in the amendment or even to sections in the specification that undermine examiner's interpretation (as set forth above), the interpretation of "maximum connectivity count" as referring to the number of vertices in the graph is utilized in this rejection for the reasons discussed above.

IV. §101 and §112 rejections of claims 7-11

Claims 7-11 are rejected under §101 for being directed towards non-statutory subject matter. The claims recite a "system" that comprises a "counter." The use of the term "system" does not inherently mean that the claim is directed towards a machine. Only if at least one the claimed elements of the system is a physical part of a device can the system constitute a machine within the meaning of §101.

The only element in claim 7 is a counter. The other limitations seem to refer to method steps and it is unclear how a "system" could comprise those steps. Thus, if the claimed counter is a physical element, then claim 7's system is a machine under §101. However, if the claimed counter is a software element, then the system is merely directed to software alone. Software by itself is neither a machine, a process, an article, or a composition of matter.

Applicant's specification is silent as to whether the "counter" is a physical or software element. However, one of ordinary skill in the art could reasonably interpret the term counter may be implemented as software. There is no discussion in Applicant's specification of any hardware or physical elements that would have led one of ordinary skill in the to believe that the system is to be implemented as a machine. Therefore, claims 7-11 are rejected for being directed towards non-statutory subject matter.

In addition, claims 7-11 are rejected under §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 7 recites a system with a counter. The other limitations in claim 7 refer to method steps and are not directed to any components that are part of the

system. This is confusing claim construction; the claim should be amended to more clearly define the system with elements that perform the steps claimed.

VI. Rejection of claims 1-4, 7-9, 12, 14, and 15 under Östergård is maintained

Claims 1-4, 7-9, 12, 14, and 15 (claim 13 has been canceled) were rejected under Östergård. Östergård teaches the amended limitations as set forth below.

VII. Rejection of claims 1-4, 7-9, 12, 14 and 15 under Kevorkian is withdrawn

Applicant's amendment overcomes the rejection of claims 1-4, 7-9, 12, 14, and 15 under Kevorkian. Thus, that rejection is withdrawn.

Specification

3> The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: claim 12 is amended to recite a "computer-readable recordable data storage medium." There is a lack of antecedent basis in the specification for this terminology.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4> Claims 7-11 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claims recite a "system" that comprises a "counter." The use of the term "system" does not inherently mean that the claim is directed towards a

machine. Only if at least one the claimed elements of the system is a physical part of a device can the system constitute a machine within the meaning of §101. There is no discussion in Applicant's specification of any hardware or physical elements that would have led one of ordinary skill in the to believe that the system is to be implemented as a machine. See also response to arguments above.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5> Claims 6, 11, and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

a. Specifically, there is no disclosure that would have enabled one of ordinary skill in the art to utilize Applicant's claimed invention to project selection, fault tolerance, coding, computer vision, information retrieval, signal transmission, and alignment of DNA with protein sequences.

6> Claims 1-12 and 14-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one

skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

b. Applicant amends the independent claims to define the term as the "greatest integer of connectivity of said vertices obtained from said ordering of vertices."

Applicant points to page 4, lines 19-20 in support of this amendment. However, the cited lines and the entirety of Applicant's specification is devoid of any clear definition for "maximum connectivity count." There is no description for setting a count to be the "greatest integer of connectivity." More clearly, there is no disclosure of comparing the connectivity count of each vertex with a "greatest integer of connectivity of said vertices obtained from said ordering of vertices." See also the response to Applicant's arguments above.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7> Claims 7-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

c. Claim 7 recites a system with a counter. The other limitations in claim 7 refer to method steps and are not directed to any components that are part of the system. This is confusing claim construction; the claim should be amended to more clearly define the system with elements that perform the steps claimed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8> Claims 1-4, 7-9, 12, 14, and 15 are rejected under 35 U.S.C §103(a) as being unpatentable over Östergård, "A Fast Algorithm for the Maximum Clique Problem."

9> As to claim 1, Östergård discloses a method for maximizing group membership comprising:

calculating a connectivity count of each vertex in a graph, wherein each vertex represents a single item in a multiple item set [pg. 202, section 2.4 - Ordering the vertices : calculating the degree of the vertex where the degree represents the number of connections to other vertices];

placing vertices in decreasing order of connectivity based upon said calculated connectivity count of each vertex in said graph [pg. 202 : "Ordering the Vertices" - sorting the vertices with respect to their degrees (incident edges) so that the v_1 has smallest degree];

determining a maximum connectivity count from said ordering of vertices [pg. 199, 2.1 - Old Algorithms : "the number of vertices in the graph is n " | pg. 200, Algorithm 2 : max variable];

comparing the connectivity count of each vertex in said graph with the maximum connectivity count in the graph [pg. 200, line 14 of Algorithm 2 | pg. 201 - "Example"];

removing a vertex from said graph with said calculated connectivity count less than said maximum connectivity count [pgs. 200-202 : pruning those vertices whose connections are less than the max variable]; and

returning a grouping of interconnected vertices, wherein each vertex in said grouping is connected to each other vertex in said grouping, and a quantity of interconnection is equal to said maximum connectivity count [pg. 200 - "the size of a maximum clique is given by $c(1)$ "].

Östergård does not expressly disclose the term "maximum connectivity count" but does disclose calculating the number of vertices in the graph. As discussed in the §112 rejection above, "maximum connectivity count" is interpreted as number of vertices in the graph. Thus, it would have been obvious for one of ordinary skill in the art to have reasonably inferred that Östergård's disclosure of number of vertices in the graph is equivalent to Applicant's claimed "maximum connectivity count."

10> As to claim 2, Östergård discloses updating said connectivity count for all remaining vertices in said graph following removal of a single vertex from said graph [pg. 200, Algorithm 2 (line 17)].

11> As to claim 3, Östergård discloses individually removing all vertices with said connectivity count less than said maximum connectivity count in said graph [pgs. 201-202 : pruning vertices].

12> As to claim 4, Östergård discloses removing all vertices in said graph until said connectivity count of a least connected vertex is equal to said maximum connectivity count [pg. 200, Algorithm 2 (lines 24-29) : for loop].

13> As to claims 7-9, as they do not teach or further define over previously claimed limitations, they are rejected for at least the same reasons set forth for claims 1-4.

14> As to claim 12, Östergård discloses an article comprising:
a computer-readable recordable data storage medium [pg. 206 : Östergård discusses utilizing a CPU; therefore it would have been obvious for one of ordinary skill in the art to have reasonably inferred a computer-readable medium];

means in the medium for calculating a connectivity for each vertex in a graph [pg. 202, section 2.4 - Ordering the vertices];

means in the medium for determining a maximum connectivity count from said ordering of vertices [pg. 199, 2.1 - Old Algorithms : "the number of vertices in the graph is n" | pg. 200, Algorithm 2 : max variable];

means in the medium for placing vertices in decreasing order of connectivity based upon said calculated connectivity count of each vertex in said graph [pg. 202 : "Ordering the

Vertices” – sorting the vertices with respect to their degrees (incident edges) so that the v_i has smallest degree];

means in the medium for selecting a least connected vertex for removal from a clique in said graph [pg. 202, section 2.4 - Ordering the vertices : choosing the vertex with the least degree]; and

means in the medium for removing said least connected vertex from said graph to return a group of interconnected vertices with an interconnection quantity equal to said maximum connectivity count [pgs. 200-202 : pruning those vertices whose connections are less than the max variable | “the size of a maximum clique is given by $c(1)$ ”].

15> As to claim 14, Östergård discloses said means for selecting a least connected vertex for removal from a clique in said graph includes comparing a connectivity count of said least connected vertex with said maximum connectivity count obtained from placing vertexes of a graph in descending order [pg. 202, section 2.4 - Ordering the vertices : placing the vertex with smaller degree first].

16> As to claim 15, see rejection of claim 2.

17> Claims 5, 6, 10, 11, 16 and 17 are rejected under 35 U.S.C §103(a) as being unpatentable over Östergård in view of Pardalos et al, “An Exact Parallel Algorithm for the Maximum Clique Problem” [“Pardalos”], in further view of Szymanski et al, “Spanning Tree Algorithm for Spare Network Capacity” [Szymanski].

18> As to claim 5, 10 and 16, Östergård does not expressly disclose said vertex being selected from a group consisting of: a computing node, components on a circuit board, division of points in a pattern, or partition of items.

19> In the same field of invention, Pardalos is directed towards the same problem as Östergård. Pardalos is concerned with finding maximum cliques on general graphs. Pardalos discloses that a solution to such a problem has wide ranging applications, including circuit design, geometry and fault diagnosis. As such, Pardalos teaches selecting a vertex from components on a circuit board (circuit design), points in a pattern (geometry) and partition of items (fault diagnosis of multiprocessor systems) [pg. 3]. It would have been obvious to one of ordinary skill in the art to incorporate Pardalos' teachings into Östergård; namely to modify Östergård's maximum clique algorithm for use with components on a circuit board and points in a pattern. Pardalos' teaches that finding maximum cliques, as in Östergård, are especially useful such applications [Pardalos, pgs. 2-3].

20> In the same field of invention, Szymanski discloses applying maximum clique techniques to problems concerning networks. Szymanski discloses that a vertex in a graph is a computer node [pg. 0448]. It would have been obvious to one of ordinary skill in the art to incorporate Szymanski's teachings into Östergård; namely to modify Östergård for use with computer nodes. One would have been motivated to provide such a modification to use Östergård's algorithm for network capacity problems as taught by Szymanski.

21> As to claims 6, 11 and 17, Östergård discloses said graph is a cluster of nodes [pg. 201, Figure 1] but does not disclose the other applications as claimed.

22> Pardalos discloses applying maximum clique techniques to graphs that are selected from a group consisting of: circuit board components, pattern recognition, archaeology data, project selection, fault tolerance, coding, computer vision, information retrieval, signal transmission and alignment of DNA with protein sequences [pgs. 2-3]. It would have been obvious to one of ordinary skill in the art to have modifies Kevorkian to include the various graphs as taught by Pardalos. Pardalos teaches that maximum clique techniques can be applied to wide variety of applications in science and engineering. One would have been motivated to provide such a modification to increase the functionality of Östergård's system with respect to the variety of disciplines as taught by Pardalos.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

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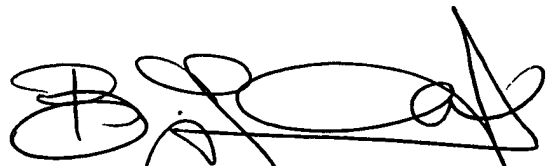
shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dohm Chankong whose telephone number is 571.272.3942. The examiner can normally be reached on Monday-Friday [8:30 AM to 4:30 PM].

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bunjob Jaroenchonwanit can be reached on 571.272.3913. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DC
1/16/08


BUNJOB JAROENCHONWANIT
SUPERVISORY PATENT EXAMINER
1/